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CONTENTS

<i>Valedictory Address to the Graduating Class of Jefferson Medical College:</i> PROFESSOR GEORGE S. HUNTINGTON	233
<i>The Thirty-sixth General Meeting of the American Chemical Society:</i> B. E. CURRY	237
<i>Scientific Books:—</i>	
<i>Drew's Invertebrate Zoology:</i> PROFESSOR J. S. KINGSLEY. <i>Walsh's Makers of Modern Medicine:</i> DR. W. G. MACCALLUM	250
<i>Scientific Journals and Articles</i>	251
<i>Discussion and Correspondence:—</i>	
<i>Stöhr's Text-book of Histology:</i> DR. FREDERIC T. LEWIS. <i>Seismotectonic Lines and Lineaments:</i> PROFESSOR WM. H. HOBBS. <i>Railway Signals:</i> PROFESSOR GEORGE M. STRATTON	252
<i>Special Articles:—</i>	
<i>Diemictylus or Notophthalmus as Names of a Salamander:</i> DR. THEO. GILL. <i>A New Rhythm and Time Device:</i> PROFESSOR KNIGHT DUNLAP. <i>On Quinine Sulphate and Human Blood:</i> DR. THOMAS M. WILSON	256
<i>Botanical Notes:—</i>	
<i>Farm Botany; Fossil Iowa Plants; Our Forest Reserves; History of American Botany; South Dakota Conifers; Seeds of Common Grasses; A Tropical School of Botany; Dr. Maxwell T. Masters; Progressus Rei Botanicae; New Edition of Campbell's Botany; Experiments on the Influence of Light:</i> PROFESSOR CHARLES E. BESSEY	258
<i>The Concilium Bibliographicum:</i> PROFESSOR HENRY FAIRFIELD OSBORN	260
<i>The British Association's Grants for Scientific Research</i>	261
<i>Scientific Notes and News</i>	261
<i>University and Educational News</i>	263

MSs. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

VALEDICTORY ADDRESS TO THE GRADUATING CLASS OF THE JEFFERSON MEDICAL COLLEGE, PHILADELPHIA, JUNE 3, 1907

I HAVE been honored by the request of your institution to pronounce the valedictory address to the members of this year's graduating class, and it appears to me that I can best perform my duty by taking full advantage of the position which I occupy towards you and your alma mater. As you know the outsider sees most of the game, and coming before you as a stranger from a sister institution, keenly interested in the progress and development of medical science and medical teaching in our country, I can speak to you all the more freely and frankly of your relation to your academic foster-mother, of the value of the heritage which she to-day bestows on you, and of your obligations to her, present, past and future.

It is almost a misnomer to speak of a valedictory address to a class of graduating medical men. It is true that in one sense, the purely physical and narrow aspect, this day marks a profound change in your professional careers. You are about to close one chapter of a continued story. You bid good-bye to the lecture rooms and laboratories, to the hospitals and clinics in which you have received your preliminary training, and to the men who guided and directed your studies. And in turn, this venerable and honorable seat of medical teaching and learning, a landmark in the educational development

of our country, bids you God-speed, and offers you its commendation of work well done, its confident expectation of the equally successful work which it has a right to look for at your hands in the broader fields of your future activity. But the Jefferson Medical College does not say "Good-bye" to you, no more than you can, in the higher and broader sense of mental and moral activity, ever break the bond which you have here formed for all time. A valedictory must, under such circumstances, of necessity become a salutatory to the men who, having completed the preliminary stage of their professional life, enter into the full development and exercise of their chosen duties, a welcome to the broader expansion of their coming usefulness to mankind, a greeting of fellowship, not a farewell. It is not the bricks and mortar, the iron and stone of the Jefferson Medical College which your memory will hold among its most valued and cherished associations. No matter where your lot in life may place you, your thoughts and your hearts will turn, with the image of your alma mater before your mental vision, to the men you have here encountered, men who have taught you and modelled your lines of thought, men who stand to you as examples of success in the chosen field of their work, as standards of professional honor and of an honored profession, of upright life and dealing, of high place in their community. These are the men who have given to this college of yours, all through the long years of its honorable career, the high reputation and exalted standing of which you are to-day proud. That is what the Jefferson means to you, and will continue to mean all your life, and those ties are not broken by graduation. You, the most recent graduates, share with your predecessors, and will so share with those who are to follow you

in the years to come, an heritage of untold value in the influence and incentive which your alma mater through these men has extended to your development.

But it seems to me that it is not enough for you to be merely justly proud of this association, to be satisfied with a grateful acknowledgment of your institution's services to you as undergraduates. *Noblesse oblige*—and I think that each one of you owes her a debt, which for value received in stimulation, example, incentive and education, you will try to discharge to the best of your individual ability. It is true, as we have just said, that the strength of a school lies not in the value and extent of costly buildings and equipment, but in the force, character and ability of the men selected to perform its work. That is clear, because they form a concentrated group, where the individual effort and the combined efficiency are evidenced in the daily contact with the student body and with the public at large. But it is also true that the real strength of a teaching institution is dependent in equal proportion upon the character and standing of the men sent forth from its training to their life's work. Their relation to their college is not so strongly in direct evidence, because they are distributed as individuals, but it is none the less real and vital. Their very dispersion affords the opportunity of carrying to all parts the influence and stimulation which they have received, the standards which they have been trained to hold in their work and in their broader relation to the community. Lowering of these standards, failure and inefficiency in the work—that is, perhaps you may think, a wrong which will primarily wreak itself on the individual at fault. But it has a more extended meaning, it carries beyond the mere personality involved, it is a wrong to the institution to

which you owe so much, who honors you with her endorsement to-day, who certifies for your efficiency to the public, who counts on you to uphold her high traditions, and who confides no small part of her reputation to your care and custody. And with the sense of this responsibility assumed on your part I give you greeting and welcome from the school which to-day awards to you its degree, and extend to you the fellowship of the profession whose ranks you to-day formally join.

And now permit me for a moment to look back on some of your personal experiences of the past four years of undergraduate life, and to ask you to consider and interpret them in reference to the influence they should exert on the shaping of your future careers. Any one of your various branches of study will furnish ample material to point my meaning, but let me draw my illustration from my own field and recall to your minds some phases of your anatomical studies. Probably, at the very outset of your anatomical work you were more or less confused and overwhelmed by the multiplicity of detail which you were called upon to master. Much of it undoubtedly appeared to you unnecessarily complicated, needlessly minute and exhaustive in description and classification. Eager for the practical application of knowledge, you possibly questioned the actual value of some of the information which, by the terms of your course, you were required to make your own. But let me ask you now, at the close of your successful preparatory period, to regard the hours thus spent from a slightly different standpoint and to draw from your experience a lesson for your future independent guidance and conduct. Remember, in the first place, that to many of you, at least, when you began your professional work as undergraduates of this school,

methods of natural object study were new and the correct perspective difficult to acquire. Subconsciously, perhaps, you gradually came to realize the value of the training which these early anatomical exercises developed in the close association and co-ordination of brain, hand and eye.

It is quite true that to you, practitioners of medicine and surgery, much of the knowledge thus acquired will be of no direct practical use in its individual and concrete form. To the coming expert in internal medicine the foramina and processes of the sphenoid bone are of little importance, nor does the successful practitioner of midwifery find that his cases hinge on his knowledge of the terminal distribution of the ulnar artery. As stated thus boldly, this is undoubtedly true, but in drawing these conclusions you should not lose sight of some important facts.

In the first place, whatever special avenue of professional activity may open to you, the training which you have received here in mastering the details of organic structure, in correctly estimating the physical, mechanical and biological problems you will encounter, in analyzing the trend and the ultimate effect of a pathological environment on normal structures, these are the forces which your medical course has placed at your disposal, and your ultimate success will depend on the keenness, dexterity and judgment with which you employ them. It makes little difference how you have acquired the correct methods of study and interpretation, to what exercise you owe the delicacy of touch, the capacity for accurate observation and logical deduction. You have chosen an arduous profession. You have passed successfully through your preliminary training. You are fitted to begin your real work, but remember that this

real work, the work which in the end is going to count for you, for your institution, for your profession as a whole and for mankind at large, that work, as far as it may be placed in your hands, is just about to begin. And in that work the same methods that you have followed in your undergraduate course, of accurate observation and record, of close examination by sight and touch, of correct analysis and sound comprehensive synthesis, of reliable memory and logical deduction from established facts—these are the elements which will produce real results. The era of empiricism in medicine has passed for good and all, and to-day the practitioner of medical science must be a scientist in the true sense of the word and work by scientific methods.

Because of this fact I ask you to recognize the value of the training you have received and to realize that in no other way could the mental and physical aptitude for your work have been developed.

Again, let me point out to you what the acquisition on your part of sound methods of biological study means to you, as active participants in the steady advance of the future. As you look back over the earlier developmental stages of medicine your mind reverts to certain great landmarks, mile-stones in the natural progress of the science. You will think of asepsis, surgical anæsthesia, serum therapy and other great achievements in special fields. But consider the vast amount of infinite care and patience and keen reasoning which led up to these epoch-making advances, think how much close observation and correct experiment bridged the intervals between them.

Nothing in the biological sciences is so minute that it may be safely overlooked, nothing apparently so unimportant that it may be safely disregarded. A few years

ago the parabronchial bodies were scarcely noticed or known. Contrast this with the modern parathyroid therapy of tetanus. And so I say to you again that, as you look back over your undergraduate course, the work you have accomplished should mean to you the preparatory training for the work now before you, and in whatever line you find that work, as your professional lives shape themselves, there you will use and further develop the methods of observation which you have acquired in this school.

A few days ago I received an abstract of a report covering the work of your department of general anatomy for the academic year just closing. To all who have the sound development of scientific medical education close at heart it is a most inspiring document, both in the performance of achieved advance and in promise for the future. I venture to extend to this institution the cordial congratulations and full appreciation of a sister university for this material evidence of high standards and purposes. For we are all, individuals as well as schools, working for the common end, and the more complete our mutual faith and confidence is, the closer we stand shoulder to shoulder, the steadier and surer will be the advance of medical education and the resultant progress of the medical profession.

I can not do better than close my remarks to you with a quotation from the document referred to, in which your professor of general anatomy states:

In this, the constructive period of the present anatomic course, the department recognizes that charts, drawings and models, however valuable they may be as aids to teaching, fail in replacing the actual structure for purposes of study and instruction. It is a cardinal principle of anatomic teaching that the student learns his anatomy chiefly in the dissecting room and in the section teaching. But the student can be assisted advan-

tageously by a well-equipped study collection, comprising not only preparations of adult human structures, but of comparative and embryonic material as well, arranged to illustrate the unity of plan in vertebrate structure.

I think this paragraph states as concisely and clearly as possible the twofold basis underlying all sound study and investigation, not alone in morphology, but in the whole range of the biological sciences, of which medicine is a part, *viz.*, close scientific observation of the actual conditions presented by any problem, and the correlated study of the developmental stages which have produced these conditions.

"Alles Gewordene wird erst verständlich in dem Werden" is the way a great German puts it.

To men who have been trained in these methods and principles, the Jefferson Medical College can safely and confidently intrust her future, in the full assurance that her high reputation will be sustained at their hands.

And so, once again, I bid, on behalf of the trustees and faculty of this institution, God-speed and good fortune to the members of the graduating class.

GEORGE S. HUNTINGTON

COLUMBIA UNIVERSITY

*THE THIRTY-SIXTH GENERAL MEETING OF
THE AMERICAN CHEMICAL SOCIETY*

THE thirty-sixth general meeting of the American Chemical Society was held in Toronto, Canada, during Thursday, Friday and Saturday, June 27-29, the place of meeting being the chemical building of Toronto University. At the opening session Emerson Coatsworth, mayor of the city of Toronto, delivered the address of welcome. This was followed by a short address by Ald. J. J. Graham. A welcome on behalf of Toronto University was extended by Dean Maurice Hutton. These

addresses were followed by a response on behalf of the members of the society by its president, Professor Marsten T. Bogert.

The members of the local committee were untiring in their efforts to provide for the comfort and entertainment of their guests. This meeting will long be remembered because of the generous hospitality extended to the visiting members.

Luncheons were served in the university building on Thursday and Friday by the courtesy of Toronto University. Thursday afternoon the members of the society were the guests of Mr. Edmund B. Osler, M.P., and Mrs. Osler at a garden party in the grounds of Craigleigh, at Rosedale. In the evening the members were entertained by the local committee and the commodore and officers of the Royal Canadian Yacht Club at Centre Island. In the earlier part of Friday afternoon, the society visited various industrial establishments in Toronto. Later in the afternoon the members of the society were the guests of the Lieutenant Governor of Ontario and Mrs. Mortimer Clark at the Government House. Friday evening the members of the society banqueted at McConkey's. On this occasion Professor Maurice Hutton, chairman of the local committee, proved himself to be a very entertaining toastmaster.

Saturday morning the society was taken to Guelph on a special train to visit the Ontario Agricultural College and Experimental Farm. Luncheon was served at the residence by courtesy of the college.

Saturday evening the visiting members began the trip to the Cobalt mining camp on a special train provided for the occasion. Temagami Lake was reached early Sunday morning. After breakfast a boat was in waiting to carry the society thirty-five miles across the lake to the Lady Evelyn Hotel, where dinner was served.

Monday morning the train reached the

mining camps of Cobalt. Here small parties were formed and visits were made to many of the mines in the district. In the evening the visiting members were the guests of the Haileybury Club of Haileybury, Ontario. Returning, the society reached Toronto Tuesday morning.

A summary of the many events of these meetings appeared in the Toronto papers. At the last general assembly a hearty vote of thanks was extended to the local committee and the citizens of Toronto from whom these many courtesies were received.

The number of members in attendance was 150, of whom 120 were visitors. The next meeting will be held in Chicago, beginning December 26.

The following addresses were given before the general assembly:

The Measurement of Chemical Affinity:
WILDER D. BANCROFT.

Chemistry and Canadian Agriculture:
FRANK T. SHUTT.

American Chemical Research: J. BISHOP
TINGLE.

The Vagaries of Beryllium: CHARLES L.
PARSONS.

Deflocculated Graphite: E. G. ACHESON.

These addresses will be printed in full at an early date.

The following papers were read before the society:

PHYSICAL CHEMISTRY

W. D. Bancroft, chairman

Corrosion in Persulphate Solutions: J. W.
TURRENTINE, Cornell University.

Copper is dissolved in persulphate solutions quantitatively. The loss in persulphate content of the solution is equivalent to the copper dissolved. The corrosion of copper in persulphate solution is therefore analogous to the electrolytic corrosion in sulphate solutions. Nickel, aluminum and

iron also behave in persulphate solutions as one would expect from their electrolytic corrosion when made anode in sulphate solutions, *i. e.*, nickel is but slightly attacked in sodium persulphate, but more readily so in ammonium persulphate; aluminum is not attacked at all, and iron is quite readily corroded.

Coefficient of Distribution: LIVINGSTON R.
MORGAN and H. R. BENSON.

The following results are reported:

1. The molecular weights of alcohol in ether and of acetic acid in ether are the same as in water.

2. The molecular weights of acetic acid and alcohol in molten $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ and molten $\text{LiNO}_3 \cdot 3\text{H}_2\text{O}$ do not vary with the concentration.

3. The molecular weight of alcohol in benzene varies but slightly with the concentration.

4. The coefficient of distribution is shown to be independent of the heats of solution of the substance in the two solvents.

The Measurement of Chemical Affinity:
W. D. BANCROFT.

The heat of reaction is not a measure of chemical affinity; but Gibbs has shown that the electromotive force is a measure for the case of completely reversible systems. Cases which have been studied experimentally are: precipitation of metal by metal; allotropic forms of metals; amalgam cells; stable and instable salts; metathetical reactions; oxidation and reduction cells; light. When the gas pressures or the osmotic pressures are known for a system in equilibrium, it is possible to calculate the work done against the chemical affinity by displacing the equilibrium, provided the equilibrium formula is known. This gives a relation between the electromotive force and the equilibrium constant, which has been tested for: precipitation of metal by metal; amalgam cells; stable and instable

salts; metathetical reactions; oxidation and reduction cells. The method of calculating chemical affinity from the equation for equilibrium has then been applied to the cases in which electromotive force measurements are impossible or inaccurate.

There is no way at present to measure chemical affinity in the case of an apparently irreversible reaction, in other words, in the overwhelming majority of instances. It is suggested that the best line of attack is the study of the electromotive forces of irreversible cells made up of oxidizing and reducing agents.

The Stable Hydrates and Acid Salts of Ferrous Sulphate: FRANK B. KENRICK, University of Toronto.

The object of the experiments was to determine the composition of the ferrous sulphates stable at ordinary temperatures in systems containing the components FeO , SO_3 and H_2O . Mixtures of varying proportions of these components together with a little ammonium sulphate were shaken until equilibrium was reached, and the liquid and moist solid phases analyzed. From these results the composition of the solid phase was calculated, the amount of liquid adhering to the solid being determined from the quantity of ammonium found.

The existence of the following chemical individuals, besides the ordinary green vitriol, has been proved with a fair degree of certainty: $\text{FeO} \cdot \text{SO}_3 \cdot 4\text{H}_2\text{O}$, $\text{FeO} \cdot \text{SO}_3 \cdot \text{H}_2\text{O}$, $2\text{FeO} \cdot 3\text{SO}_3 \cdot 2\text{H}_2\text{O}$, $\text{FeO} \cdot 2\text{SO}_3 \cdot \text{H}_2\text{O}$ and $\text{FeO} \cdot 4\text{SO}_3 \cdot 3\text{H}_2\text{O}$.

The Mechanism of the Acetacetic Ester Synthesis: W. LASH MILLER, University of Toronto.

The rates of the condensation of oxalic ester with acetone and with ethyl acetate have been measured by Mr. Clark and Mr. Cooke, the progress of the reactions being determined by colorimetric measurements

after adding ferric chloride. Some interesting features of the behavior of the red coloring matter have been studied incidentally.

Mutual Solubility of the Chlorides of Calcium and Sodium: W. O. ROBINSON, Bureau of Soils, Washington.

The complete isotherm of the system calcium chloride, sodium chloride and water at 25° has been determined. The solubility of calcium chloride hexahydrate is very greatly depressed by sodium chloride. The "constant solution" contains 78.49 grams calcium chloride and 1.846 grams sodium chloride to 100 grams of water. The hexahydrate of calcium chloride inverts to the tetrahydrate, in presence of an excess of sodium chloride at 29° .

The Measurement of the Vapor Pressure of Solutions with the Morley-Brush Gauge: O. F. TOWER, Adelbert College, Cleveland.

The method is a differential one. The gauge was described, and the results of measurements with solutions of potassium chloride and cane sugar were given. The paper was of a preliminary nature.

Absorption of Water Vapor by Soils: F. E. GALLAHGER and H. E. PATTEN, Bureau of Soils, Washington.

The absorption of water vapor by quartz flour, a soil separate, and typical soils, has been studied with special reference to the controlling conditions. The rate of approach to equilibrium between soil and water vapor has been followed at various degrees of humidity, and these equilibrium points determined. The amount of water absorbed increases with the humidity, but not in a simple mathematical relation. The equilibria between soils and atmospheres saturated with water vapor were studied over a temperature range from 25°C. to 100°C. , and, contrary to Hilgard's results,

it was found that the amount of water absorbed decreased with increasing temperature. This confirms the results obtained by earlier investigators for the absorption of water vapor as well as for gases in general.

Determination of Solid Phases in Four-Component Systems: J. M. BELL, Bureau of Soils, Washington.

When only one solid phase is present in a four-component system, a modification of the Bancroft method for the determination of the composition of the solid may be employed. By the use of two triangular diagrams in each of which one of the ordinates represents the sum of the percentages of two components, the percentage composition of the solid may be determined graphically.

Double Sulphates of Ammonium and Calcium: J. M. BELL and W. C. TABER, Bureau of Soils, Washington.

In a recent paper d'Ans has claimed that the formula attributed by us to the double sulphate of lime and ammonium, viz., $\text{CaSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$, should have only one molecule of water. It has been found in our later experiments that washing the double salt with the liquids which d'Ans has used, causes a rapid decomposition of the compound, and it has been shown by further experiments that the formula first proposed by us is the correct one.

Reactions between Copper Sulphate and Lime: J. M. BELL and W. C. TABER, Bureau of Soils, Washington.

When lime is added in excess to copper sulphate solutions, the solid phases consist of calcium hydroxide, gypsum and blue copper hydroxide, which are thus shown to be the constituents of Bordeaux mixture. When the lime is added in just sufficient quantity to precipitate all the copper and

the solution is faintly alkaline, there is an olive-green copper hydroxide precipitated.

When lime is added in insufficient quantity to precipitate all the copper, the precipitate consists of a mixture of gypsum and a basic sulphate of copper. The basic sulphates of copper have been investigated by adding copper oxide to various copper sulphate solutions. It was found that the composition of the solid was variable and was intermediate between the two generally accepted basic sulphates of copper.

When there is neither acid nor base in excess, the study becomes one of the mutual solubility of copper sulphate and gypsum. The solubility of gypsum passes through a minimum as the concentration of copper sulphate increases.

The Solubility of Calcium Carbonate in Certain Aqueous Solutions: F. K. CAMERON and W. O. ROBINSON, Bureau of Soils, Washington.

Calcium carbonate is much more soluble in potassium sulphate solutions than in potassium chloride solutions. In solutions of potassium chloride it passes through a maximum. When the system is saturated with carbon dioxide at atmospheric pressure the calcium carbonate is again more soluble in the more dilute potassium sulphate solutions than in those of potassium chloride, where again it passes through a maximum. In the more concentrated potassium sulphate solutions syngenite is formed.

Copper as Anode in Chloride Solutions: SAUL DUSHMAN, University of Toronto.

Increasing the concentration of the chloride, or rotating the anode, increases the proportion of cuprous salt formed. The experiments are in agreement with the supposition that cuprous and cupric salts are formed in such proportions that the solution at the surface of the anode is in equilibrium with metallic copper.

The Ignition Temperatures of Gaseous Mixtures: K. GEORGE FALK, Columbia University.

The method of determining the ignition temperatures of gaseous mixtures by calculating the rise in temperature, produced by the adiabatic compression of the gases, by means of the formula

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2} \right)^{k-1},$$

in which V_1 and V_2 denote the initial and final volumes of the mixture, T_1 the initial temperature, T_2 the ignition temperature, and k the ratio of the specific heats of the gases at constant pressure and constant volume, was applied to mixtures of carbon monoxide and oxygen and the following results obtained:

	T_2 (absolute)
1 CO + O ₂	911
2 CO + O ₂	879
4 CO + O ₂	907
6 CO + O ₂	1002

The Theory of "direct" Determinations of Migration: W. LASH MILLER, University of Toronto.

The relations between concentrations of solutions, transport numbers, and motion of the boundary, may be deduced without introducing *time* or functions dependent on it (conductivity, mobility).

This method of treatment makes the relations between the direct and the analytical methods very clear, and shows how the direct method may be applied to solutions of weak acids, etc., without reference to their degree of dissociation.

A Comparison of Collodion, Parchment Paper and Gold-beater's Skin Membranes with Porcelain: S. LAWRENCE BIGELOW, University of Michigan.

Methods for making collodion membranes were investigated and developed.

Some colloids were separated from crys-

taloids, using the three above-mentioned membranes. The progress of dialysis was followed by the conductivity method, and it was found to occur fastest with gold-beater's skin, slower with collodion and slowest with parchment paper. The results indicate that collodion is to be preferred to parchment for dialyzing.

The rates at which water permeated the above-mentioned substances under different pressures and temperatures were determined. The "permeabilities" were expressed in cubic millimeters of water passing through one square centimeter of membrane per minute. When these values for permeability were laid off as ordinates, against corresponding pressures and temperatures, respectively, as abscissæ, straight lines were obtained for pressures, nearly straight lines for temperatures. This is what would be expected if Poisseuille's formula for the passage of liquids through capillaries applied. More significant than the application of the formula is the fact that the "picture" for porcelain under the same conditions so strongly resembles those for the three membranes. This is evidence, though not by any means conclusive, in favor of the view that the passage of water through membranes is a capillary process.

The article will appear shortly in one of the journals.

The Equilibrium Diagram for the Series Copper-Aluminum: B. E. CURRY, Cornell University.

The freezing point curve for this series consists of seven branches. Six series of solid solutions and one compound, CuAl₂, separate from the melt. The β and δ series of solid solutions are instable at the lower temperatures.

Electrolytic Separation of Silver from Copper: H. W. GILLET, Cornell University.

Silver can be separated electrolytically from copper in a tartrate solution by a constant voltage method. Vigorous stirring is essential if a good deposit of silver is to be obtained.

Some Unique Conductivity Curves: EDWARD C. FRANKLIN and HARRY D. GIBBS, Leland Stanford University.

With solutions of silver nitrate in methylamine the molecular conductivity first increases with increasing dilution, then passes through a maximum followed by a minimum. This abnormal behavior is probably the resultant of three factors, the self-ionization of the salt, the dissociating power of the solvent and the viscosity of the solvent.

A Dynamic Method for Determining the Temperature Pressure Curves of some Monovariant Systems of the Second and Higher Orders and its Application to a Dissociation: W. D. HORN, Bryn Mawr. This paper will appear in full in the *American Chemical Journal*.

Recent Advances in Electrolytic Analysis: EDGAR F. SMITH. Reported by title.

Electrical Conductivity of Solutions in Ethylamine: F. L. SHINN. Reported by title.

INDUSTRIAL CHEMISTRY

W. H. Ellis, chairman

Some Reactions during Water Treatment: EDWARD BARTOW and J. M. LINDGREN, The University of Illinois.

A series of tests was made to determine the amount of calcium and magnesium removed by each addition of reagent. The mineral matter in the water consisted almost entirely of the bi-carbonates of sodium, magnesium and calcium.

It was found that after the neutralization of carbon dioxide the calcium is removed. A reaction then takes place between the

reagent and sodium bicarbonate, when present, and finally, magnesium is removed. The reactions within the limits of solubility of the precipitates take place in order almost quantitatively, with but little overlapping.

The experiments suggest the necessity for considering the presence of sodium bicarbonate in water treatment.

Some Experiments to Determine the Amount of Volatile Matter in Coal: A. BEMENT, American Trust Building, Chicago.

To ensure that no combustion would occur, an inert gas was continually passed through the crucible under slight pressure during the heating process. For convenience in preparation hydrogen was employed and the charge was heated by an ordinary Bunsen burner. The result was, that even after heating for periods of 100 and 120 hours, a loss still continued, and the indications were that it would have gone on for additional periods of equal lengths of time, at least.

Deflocculated Graphite: EDWARD G. ACHE-SON, The Acheson Company, Niagara Falls.

Experiments on clays, carried out in the year 1901, showed that by adding vegetable extracts—gallotannic acid, extract of straw—to moderately plastic weak clays, their plasticity was increased, the amount of water required to produce a given degree of fluidity was lessened, and the size of the particles in suspension was much reduced.

The effect on finely divided graphite is much the same; and by the use of a little gallotannic acid and a few drops of ammonia, suspensions may be prepared which last indefinitely. Extensive tests are now being made to determine the value of this "deflocculated graphite" as a lubricant, with most encouraging results.

The Optical Rotation of Spirits of Turpentine: CHAS. H. HERTY, University of North Carolina.

In collaboration with the U. S. Forest Service the alio-resins from individual trees of the species *Pinus palustris* (long leaf) and *Pinus heterophylla* (Cuban) have been studied throughout a full season. The optical rotation of the several volatile oils shows wide divergence among trees of the same species. In the case of *P. palustris* the oils are generally dextro-rotatory, though one was found to be lævo-rotatory. The oils from *P. heterophylla* were found to be lævo-rotatory, though varying widely among the individual trees of this species. In every case, however, the rotation was found to be practically constant throughout the year.

The Volatile Oil of Pinus Serotina: CHAS. H. HERTY, University of North Carolina.

This oil, obtained by distillation of the alco-resin of the pond pine, is shown to consist chiefly of lævo-limonene. Its physical constants are given and the tetra-iodo addition product of the limonene prepared.

The Estimation of Carbon in Iron and Steel: E. P. MOORE and J. W. BAIN, University of Toronto.

During the solution of iron and steel in acidified potassium cupric chloride, it has been suspected that there is an escape of volatile hydrocarbons. The evidence has been based upon indirect methods of analysis; and by arranging for the direct estimation of any evolved hydrocarbons, it has been found that there is a constant loss during the operation, of such slight magnitude, however, as to be negligible for ordinary analytical purposes.

The Examination of Linoleum: PERCY H. WALKER and E. W. BOUGHTON.

Chemical tests as to quality of linoleum are of little value. The loss by abrasion

is of value, though when taken alone it may lead to wrong conclusions; if, however, the appearance of the samples before and after abrasion is taken into consideration this test becomes probably the best available.

Canadian Shales and Products: CHARLES BASKERVILLE and W. A. HAMOR.

Ultramarine and Pyrophyllite: CHARLES BASKERVILLE. Reported by title.

The Constants and Variables of the Parr Calorimeter: S. W. PARR.

Pure Coal and the Deterioration of Coal Samples: S. W. PARR and W. F. WHEELER. Reported by title.

Determination of Benzene in Illuminating Gas: L. M. DENNIS and ELLEN S. MCCARTHY. Reported by title.

A Furnace for Ceramic Use: FRED BONNET, JR.

A down-draught furnace built on the regenerative principle. The construction is of three circular seggars one inch thick, the inner one being eight inches in diameter. A temperature of 1,400° C. can be obtained in an eight-hour run.

INORGANIC CHEMISTRY

C. L. Parsons, chairman

Sodium Alum: W. R. SMITH.

A résumé of the conflicting statements in chemical literature regarding sodium alum, and descriptions of experiments showing that this alum exists below 33 degrees, but that it does not exist above that temperature; also results on new data for solubility, preparation, etc.

On the Non-existence of Clarke and Keblér's Cadmium Iodide: J. F. SNELL, University of Cincinnati.

Crystallization of cadmium iodide from hydriodic acid, decolorized by cadmium, resulted in formation of products of low

specific gravity, similar in behavior to those described as cadmium iodide by Clarke and Kebler (*Am. Chem. J.* 5, 235, 1883), but these on analysis proved to contain some hydriodic acid and water. It is concluded that there is no satisfactory evidence of the existence of a form of cadmium iodide of lower specific gravity than 5.6.

Platinum Resistance Furnace for Melting Points and Combustions: S. A. TUCKER.

A description of a new electric furnace consisting of a quartz tube, heated by a spiral of platinum tape, the whole being surrounded by infusorial earth enclosed in an asbestos box. Most excellent results on combustions and on the determination of melting points were obtained in this apparatus.

Determination of Carbon Dioxide: W. H. WAGGAMAN, Bureau of Soils, Washington.

The apparatus differs from that previously described by Cameron and Breazeale, by having an Ostwald regulator to control the flame under the decomposition flask, and by having a coil of tubing to cool the upper portion of the flask. Fairly accurate results for CO_2 from several organic compounds and carbonate minerals have been obtained in forty minutes.

Some New Compounds of Indium: F. C. MATHERS and C. C. SCHLEUDERBERG, Cornell University.

This paper outlines the methods of preparation and properties of some new compounds of indium.

Indium perchlorate was prepared by dissolving metallic indium in perchloric acid. The solution was allowed to crystallize in a vacuum desiccator.

Indium iodate was prepared by precipi-

tating a solution of indium chloride with potassium iodate. It is a white crystalline substance, soluble in 1,500 parts of water and 150 parts of 1:5 nitric acid. It is decomposed by hydrochloric acid.

Indium selenate was formed by dissolving indium hydroxide in selenic acid which had been prepared by the electrolysis of copper selenate.

Indium caesium selenate (alum) was prepared by crystallizing a solution of *indium selenate* and *caesium selenate*.

The Separation of Iron from Indium: F. C. MATHERS, Cornell University.

Nitrato β -naphthol quantitatively precipitates iron from an acetic acid solution while indium remains in solution. Colorimetric analysis of the indium solution after the removal of the iron showed that the content of the iron varied from mere traces to .025 per cent.

A System of Qualitative Analysis for the Common Elements: The Aluminum and Iron Groups: A. A. NOYES, W. C. BRAY and E. B. SPEAR. Presented by E. B. SPEAR.

This is a continuation of the work already published in the *Journal of the American Chemical Society* and will appear later.

Distribution of Mineral Nutrients in Soil Separates: G. H. FRAILYER, J. G. SMITH and H. R. WADE. Reported by title.

Potassium Ammonozincate: EDWARD C. FRANKLIN, Stanford University.

The compound $\text{Zn}(\text{NH}_4)_2\text{NH}_3$ has been prepared and studied. The analogy between the ammonia and water systems of bases, acids and salts is shown to extend to the formation of the ammonia analogue of potassium zincate. This is a continuation of previous work along similar lines.

Separation of Lithium Chloride from the Chlorides of other Alkalies: L. KAHLENBERG and F. C. KRAUSKOPF, University of Wisconsin.

The separation depends on the solubility of lithium chloride in pyridine while the other chlorides are insoluble in this reagent. The presence of three per cent. of water is not detrimental.

The Influence of Acid Residue upon the Stability of Cuprammonium Salts: W. D. HORN, Bryn Mawr.

This paper will appear in an early number of the *American Chemical Journal*.

An Anomalous Behavior in the Radioactivity of some Uranium Compounds: RICHARD B. MOORE and HERMAN SCHLUNDT, Butler College, Indianapolis.

When a 4-N solution of ammonium carbonate solution is added in excess to a saturated solution of uranyl nitrate, a yellow well-crystallized carbonate of uranium and ammonium separates out. This salt was found to increase very considerably in activity on standing. It was found that the salt on standing lost in weight and the same effect could be obtained by heating, the increase in activity being directly proportional to the loss in weight. The nitrate, acetate and sulphate of uranium on heating behaved in a similar manner.

On heating the complex uranium ammonium carbonate, ammonia water vapor and carbon dioxide are evolved simultaneously.

The initial increase in activity that was observed on the double carbonate does not indicate that a new radioactive type of matter had been separated from uranyl nitrate by a modification of the method of Crookes. The loss in weight decreases the absorption of the α -rays and the increase in activity consequently results.

Tellurium-Tin Alloys: HENRY FAY, Massachusetts Institute of Technology, Boston.

Tin and tellurium unite to form the compound SnTe , which melts at 769° . This compound forms a eutectic with tellurium which contains 85 per cent. of tellurium and which melts at 399° . It also forms a eutectic with tin, which melts at practically the same temperature as tin, 232° . The composition of this second eutectic has not been definitely determined, but it has been established that it contains less than 1 per cent. of tellurium.

On the Properties of Sodium Bismuthate: HENRY FAY and HELEN R. HOSMER, Massachusetts Institute of Technology, Boston.

A complete study of the bismuth-oxygen ratio in various preparations of the so-called sodium bismuthate was made. From the results obtained it is highly probable that sodium bismuthate does not exist as such except in the fusion of bismuth oxide with sodium hydroxide and sodium peroxide. It is impossible to identify it absolutely here on account of the rapidity with which it hydrolyzes into sodium hydroxide and a mixture of tetravalent and pentavalent bismuth oxides.

Of the various methods for the preparation of sodium bismuthate, the fusion method alone is capable of oxidizing the bismuth to its highest form.

Vanadium Sulphide, Patronite and its Mineral Associates from Minasragra, Peru: W. F. HILLEBRAND and W. T. SCHALLER.

The Mercury Minerals of Terlingua, Texas: W. F. HILLEBRAND and W. T. SCHALLER. Reported by title.

The Reaction between Hydrazine Sulphate and Ammonium Vanadate: A. W. BROWNE and F. F. SHETTERLY.

This article will appear in the *Journal of the American Chemical Society*.
Separation of the Yttria Earths: BENTON DALES. Reported by title.

ORGANIC CHEMISTRY

J. Bishop Tingle, chairman

- I. *On the Affinity Constant and Constitution of Several Urazoles*. II. *On the Velocity Constants of the Reactions between Alkyl Halides and Urazoles*: S. F. ACREE and G. H. SHADINGER.

The affinity constants of phenyl-urazole and 1-phenyl-4-methyl-urazole are 0.00001, that of 1-phenyl-2-methyl-urazole is 0.00000006, that of 1-phenyl-3-ethoxy-urazole is 0.00000004, while the constants for phenyl-3-thio-urazole and 1-phenyl-3-thio-4-methyl-urazole are 0.017. New evidence has thus been produced in favor of the view that phenyl-urazole and phenyl-3-thio-urazole are tautomeric compounds.

Work on the reactions of alkyl halides with urazoles, hydroxides, carbonates, thioacetates, etc., proves that the alkyl halide reacts with the anion of the urazole, hydroxide, etc.

The alkyl halides do not seem to form alkyl derivatives through the intermediate dissociation into alkyl and halide ions.

The alkyl halides do not seem to react with salts by first uniting with the cathion and forming a complex cathion which then reacts with the anion.

The alkyl halide seems to react as a neutral molecule with the anion of the substance which is alkylated.

The Synthesis of 7-amino-4-Quinazolones from m-toluylenediamine: M. T. BOGERT and V. J. CHAMBERS, Columbia University.

The diamine was acetylated, the toluene methyl group oxidized to carboxyl, the acetanthranil prepared from this di-acet-

amino acid, and quinazolones produced by condensing this acetanthranil with primary amines.

An Investigation of Certain Properties of the Sulphanilic Acids: V. J. CHAMBERS, Columbia University.

A preliminary study of certain reactions of o-sulphanilic acids, together with the determination of the relative stability of the acyl derivatives of o-, m- and p-sulphanilic acids.

Studies in Nitration III. Nitration of N-Acylated Compounds of Aniline derived from Monobasic Acids: J. BISHOP TINGLE and F. C. BLANCK, Johns Hopkins University.

The experiments were carried out under the same general conditions as were employed in the nitration of the N-alkyl derivatives of aniline; nitric acid alone, and in admixture with acetic acid, oxalic acid, trichloroacetic acid and concentrated sulphuric acid, respectively, being employed. The following acyl-derivatives were used: formanilide, acetanilide, trichloroacetanilide, propanilide, stearanilide, benzanilide, meta-brombenzanilide, orthotolylsulphoneanilide, phenylsulphoneanilide, phenylacetanilide, picranilide. All the products of the reaction have not yet been fully identified.

On the Constitution of Phenyl-urazole (III.): A Contribution to the Study of Tautomerism: S. F. ACREE, Johns Hopkins University.

Experimental work and the application of the mass law show that the relative amounts of the two stable derivatives formed in the reaction of a tautomeric compound, existing in two tautomeric forms in equilibrium, and another reagent depend upon (1) the relative reactivity of the two tautomeric forms towards the other reagent, (2) the ratio between the amounts of the two tautomeric forms when they are

in constant equilibrium with each other, and (3) the rapidity of the change of each of these tautomeric forms into the other as the equilibrium between them is disturbed.

Various phases of the equilibrium conditions existing in solutions of tautomeric acids or bases, or their salts, have been studied by the application of the mass law.

The conditions under which normal and abnormal hydrolysis of salts of tautomeric compounds can be determined have been discussed.

A large number of derivatives of phenylurazole have been made and studied.

Studies in Catalysis: S. F. ACREE and J. M. JOHNSON, Johns Hopkins University.

The study of the rearrangement of acetyl-chloramino-benzene in the presence of acids has shown that the velocity is proportional not to the concentration of the hydrogen ions, but to the square of the concentration of the hydrogen ions.

The study of the reactions of carbonyl compounds with hydroxylamine and hydroxylamine hydrochloride has shown that the reaction is a reversible catalytic one, and that the equilibrium point is changed by a change in the concentration of the hydrogen ions.

A general discussion of catalytic reactions has shown why the three so-called laws of catalysis were deduced from the experimental material previously available, and under what conditions they do or do not hold.

The Use of Benzyl Cyanide in the Synthesis of Certain Aromatic Succinic and Glutaric Acids: S. AVERY, F. W. UPSON and G. R. MCDOLE, University of Nebraska.

Analogous to sodium malonic ether, sodium benzyl cyanide condenses with aldehyde cyanhydrins to form products which on hydrolysis yield alkyl succinic acids. S-diphenyl succinic and the heretofore un-

known s-isopropyl phenyl succinic acid were formed by the above reactions.

With the ethereal salts of unsaturated acids, sodium benzyl cyanide forms condensation products analogous to those obtained by Michael's reaction. On condensing with ethyl cinnamate and hydrolyzing, two stereo isomeric phenyl glutaric acids were formed.

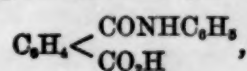
Mechanism of the Claisen Condensation: J. BISHOP TINGLE and E. E. GORSLINE, Johns Hopkins University.

The condensation product of ethyl phthalate and camphor exists in the keto and enolic forms.

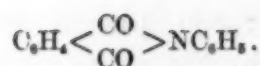
A study has been made of the action of sodium and of sodium ethylate on ethyl benzoate. Sodium ethylate is eliminated and, apparently, a sodium compound, $C_6H_5C(ONa):C(ONa)C_6H_5$, is formed. With water this is converted quantitatively into benzyl alcohol and benzoic acid, in equi-molecular proportion. Ether does not exert any apparent catalytic effect on the formation of the above sodium compound of ethyl benzoate; and sodium ethylate, free from alcohol, is without action on ethyl benzoate. Experiments in which the quantity of sodium was varied show that the yield of condensation product is greatly increased by treating the ester with two atomic proportions of sodium and then adding sodium camphor.

Intermolecular Condensation in the Phthalic Acid Series: J. BISHOP TINGLE and B. F. LOVELACE, Johns Hopkins University.

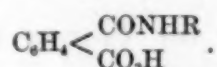
At the last meeting of this society Tingle and Cram reported that phthalanilic acid,



in presence of aniline and alcohol, is converted at a temperature below the boiling point of the latter into phthalanil,



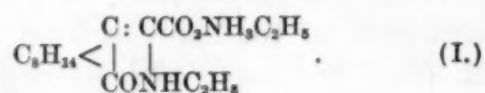
The investigation has been continued by us in two directions; on the one hand, we have studied the effect of bases other than aniline on the condensation, and, on the other hand, have endeavored to ascertain the result obtained by substituting for phenyl some other group in the compound,



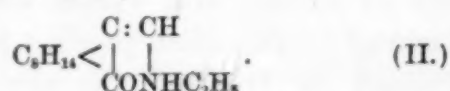
Results show that by the use of pyridine or quinoline instead of aniline the phthalanilic acid is transformed into phthalanil as readily as by the use of aniline. Consequently the condensation must be due to salt formation and not to the reactivity of the carbonyl group.

Action of Primary and Tertiary Amines on Camphoroxalic Acid: J. BISHOP TINGLE and L. F. WILLIAMS, Johns Hopkins University.

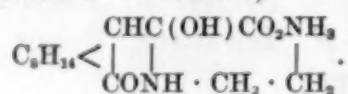
Ethyl-amine yields a compound of the type



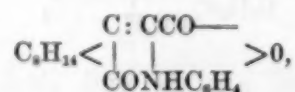
When heated above its melting point it yields the derivative,



Ethylene diamine reacts to some extent like a secondary amine, because the elements of water are not eliminated; the condensation compound has the formula,



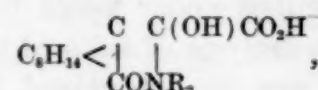
Paranitraniline gives a derivative of the type (II.) above. Orthoaminophenol yields a lactone,



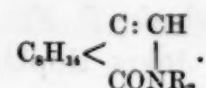
whereas paraminophenol gives a compound of type (I.).

Action of Secondary Amines on Camphoroxalic Acid: J. BISHOP TINGLE and L. F. WILLIAMS, Johns Hopkins University.

The diketone employed was camphoroxalic acid. The following amines were investigated: diamylamine, diisoamylamine, diisobutylamine. These all gave compounds of the type,



which, when heated above the melting point, evolved carbon dioxide and water, giving the compound



Dibenzylamine yielded *directly* a derivative of this second type. The same is true of methylaniline, ethylaniline and of acetylphenylhydrazine. Benzylethylamine, on the other hand, gave compounds of both types.

The Action of Benzene and Selenic Acid: HOWARD W. DOUGHTY, University of Wisconsin.

The following compounds were made and studied: $(\text{C}_6\text{H}_5\text{S}_2\text{O}_3)_2\text{Ba}$, $(\text{C}_6\text{H}_5\text{S}_2\text{O})_2\text{Ba}$ and $\text{C}_6\text{H}_5\text{S}_2\text{O}_3\text{H}$. The acid product begins to break down at 182° .

Tetrachlorgallein and some of its Derivatives: W. R. ORNDORF and T. G. DELBRIDGE. Reported by title.

Studies in Nitration IV. Nitration of N-Acylated Compounds of Aniline derived from Dibasic Acids: J. BISHOP TINGLE and F. C. BLANCK, Johns Hopkins University.

The following aniline derivatives were investigated: oxalic acid, oxanilide, succinanilic acid, succinanil, succinanilide, tartranilide, phthalanil, phthalanilic acid. In general, the results were in agreement with those recorded in the other papers of this

series. The position taken up by the entering nitro group appears to depend not only on the nature of the groups already present in the molecule, but also, and to a very marked extent, on the strength of the acid which is mixed with the nitric acid.

Studies in Nitration II. Nitration of Aniline and of its N-Alkyl and Aryl Derivatives: J. BISHOP TINGLE and F. C. BLANCK, Johns Hopkins University.

A large number of experiments have been carried out with nitric acid alone and when mixed with glacial acetic acid, oxalic acid, trichloroacetic acid and concentrated sulphuric acid, respectively, in order to ascertain its action on aniline, methyl-aniline, ethyl-aniline, diethylaniline, dimethylaniline and diphenylamine. It is found that oxalic acid is without apparent influence on the reaction. As regards aniline itself, it is shown that aniline nitrate is always the first product formed during nitration; that, in presence of a slight excess of concentrated nitric acid, a colored dehydration compound is obtained. This is analogous to certain colored derivatives of the nitrophenols and is being further investigated.

Conditions affecting the Claisen Condensation: J. BISHOP TINGLE and E. E. GORSLINE, Johns Hopkins University.

Most of the experiments were carried out with camphor, but in some cases other ketones were used. The results show that calcium or sodamide react only at relatively higher temperatures and the presence of a little alcohol is necessary; with sodium as the condensing agent the time required for the reacting substances to attain equilibrium is a function of the temperature. The effect of variation in the solvent is quite marked. The esters of the higher aliphatic monobasic acids appear to react somewhat differently from the esters of

similar acids belonging to the aromatic series.

AGRICULTURAL, SANITARY AND BIOLOGICAL CHEMISTRY

Frank T. Shutt, Chairman

Unification of Terms used in Reporting Analytical Results: CYRIL G. HOPKINS, University of Illinois.

It is pointed out that there is great lack of uniformity in existing literature in the terms used for reporting analytical results, especially in agricultural chemistry.

In view of these facts, and providing concurrent action is taken by the Association of Official Agricultural Chemists and by the American Chemical Society, the Association of American Agricultural Colleges and Experiment Stations has endorsed a report favoring the adoption of the element system for reporting analytical results in the analysis of soils, ashes and fertilizers, as rapidly as possible.

In the case of foodstuffs, condiments, etc., it is recommended in the statement of analytical results to use names of compounds or groups of compounds actually present as such in the material, this being in accordance with the present general practise.

On a Method of Applying Moss Litter for Deodorizing and Desiccating Purposes: THOMAS MACFARLANE. Reported by title.

The Determination of Boric Acid in Common Salt: W. D. BIGELOW and CLEMENT S. BRINTON, Bureau of Chemistry, Washington.

The authors collected about eighty samples of common salt, representing all grades, from the various manufactures over the United States, and examined them for the amount of boric acid present, using a modification of Howard's method for turmeric

in mustard (SCIENCE, Vol. 19, page 583). Of the eighty samples examined only six contained boric acid to exceed 1 part in 100,000. Five of these samples were examined for boric acid by Thompson's method, with the following results: 0.020 per cent., 0.096 per cent., 0.202 per cent., 0.064 per cent., 0.080 per cent. All of the samples which ran high in boric acid were obtained from the western part of the United States, and the majority from Nevada.

Solubilities of Food Colors: EDWARD GUDEMAN, Suite 903-4, Postal Telegraph Building, Chicago.

Preliminary report on collaboration work with Professor E. R. Ladd, Associate Referee on Colors, Association Agricultural Official Chemists.

The solubilities of three coal tar colors, Oraline Yellow, Turquine Blue and Aamaranth Red, and of three vegetable colors, Accoline Yellow, Lazuline Blue and Cladonal Red, were determined in cold and hot water, muriatic acid (1 per cent.), ammonia (1 per cent.), ether, petroleum ether, ethyl, methyl and amyl alcohols, acetone, acetic and amylic ethers, carbon disulphide, class; and conclusions drawn were that solubilities of the colors themselves and of the extraction values of the solvents are no criterion to judge the character nor the class of the colors, and that such methods are of no value in differentiating between coal-tar and vegetable colors.

Determination of Boric Acid in Butter:

ROBERT HARCOURT. Reported by title.

Meat Extracts and Juices: W. D. BIGELOW and F. C. COOK. Reported by title.

Notes upon Composition and Analysis of 100 American Honeys: C. A. BROWNE, JR. Reported by title.

B. E. CURRY,
Secretary

NEW HAMPSHIRE COLLEGE

SCIENTIFIC BOOKS

A Laboratory Manual of Invertebrate Zoology.

By GILMAN A. DREW, Ph.D., professor of biology at the University of Maine. Pp. vii + 201. Philadelphia and London: W. B. Saunders Company, 1907. \$1.25 net.

For the majority of our students the value of our biological courses lies not in the acquisition of a more or less detailed knowledge of a series of animals or plants. Such a knowledge is, of course, a necessity in training the specialist, but the average student soon forgets the number of podobranchs and pleurobranchs of the lobster, never remembers long the exact position of the synergides and in six months' time can not tell whether yellow or green is the Mendelian dominant in peas. The greatest gain to the student is in a training of the powers of observation and the cultivation of a spirit of independence which does not accept a thing as so upon the *ipse dixit* of the text.

From this standpoint Drew's laboratory manual seems most excellent pedagogically. It does not tell him what he will find (and usually he will find it if so told), but it asks him what he does find and refers him to the specimens for the answers. In the hands of the competent teacher the resulting training is most excellent, while such directions in the hands of an incompetent instructor—well, such books will force the incompetent into other lines.

The proof of the pudding, says the old saying, lies in chewing the string. Just so the real test of this as of all other class books, lies in its actual use with students. As far as one may judge from reading the pages, Dr. Drew has produced a work of real value. Twelve groups of invertebrates are recognized, and in each, detailed directions for the study of one or two forms are given and accompanying these are hints for the external study of allied forms. If these are followed out they afford ample illustration of the tables of classification with which each group is introduced. More matter is introduced than can be used in the ordinary year's course, but this is not a disadvantage, as it allows a choice of forms according to the exigencies of location,

the predilections of the instructor and the like. A rather careful reading of several sections reveals no serious faults, while typographical errors are few. We have not met any directions for injection; although starch mass is mentioned several times, no formulæ are given for its preparation. "Calkins" is referred to several times, but the beginner can hardly be expected to know of Calkins's work on the Protozoa. Aside from this, references to the literature are few. *Lencosolenia* occurs on p. 17.

J. S. KINGSLEY

Makers of Modern Medicine. By JAMES J. WALSH. Fordham University Press. 1907.

Dr. Walsh describes in this book the life and works of several famous men who are in a way the founders of modern medicine, but the names are hardly those which one would select as representing in a well-rounded way the foundation of modern medicine as a whole, since some of the very greatest are not mentioned. Vesalius, Harvey and Virchow would certainly deserve places if there were any intention of making such a complete list, but in his preface Dr. Walsh explains that this is a series of sketches which may be followed by others. In these subsequent sketches we may perhaps hope to find some mention of the great surgeons who have done so much to help in building the foundations. Morgagni, Auenbrugger, Jenner, Galvani, Laennec, Graves, Stokes and Corrigan, Müller, Schwann, Bernard, Pasteur and O'Dwyer form the subject of the sketches, which are very uniform in plan and general treatment.

Perhaps the most striking thing in this uniformity is that every one of the men described was of the Catholic faith and the essays in each instance lead up to a discussion of their devotion to the church, and to the dominant idea that great scientific work is not incompatible with devout adherence to the tenets of the Catholic religion.

Dr. Walsh recognizes well the salient characters of these men, the great teachers, the great humanitarians, the toiling investigators and the brilliant geniuses who make one step into the unknown, and makes clear too

the interdependence of these qualities upon one another in the truly great. Thus there seems no doubt that in comparing Laennec with Auenbrugger we must see that while their most brilliant achievements were alike signal advances in the art of physical diagnosis, Laennec's power as a teacher, his discoveries in the realm of pathological anatomy and his deep human sympathies mark him out as a man standing on a higher plane than that of Auenbrugger. In any such series of essays it becomes necessary for the writer to form some such estimate of the relative importance of the life-work of each man and here doubtless many would differ from Dr. Walsh in some respects; but as far as he allows himself to discuss this, he is fair and his estimates well weighed.

The papers were written and published separately at intervals and later put together into book form, and this results in a good deal of repetition of monotonous discussion as well as of incident and quotation, but on the whole for the purpose for which they are aimed, the general instruction of the public in matters pertaining to medical history, they are, like the similar essays of Richardson, extremely entertaining and useful.

W. G. MACCALLUM

THE JOHNS HOPKINS UNIVERSITY

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for July opens with a note on the "Agassiz Centennial," being the remarks of Charles W. Eliot. These remarks, being brief and to the point, and couched in smooth English give a much better idea of the charm of Agassiz and the great influence of his personality than do most of the longer articles that have appeared. A. W. Morrill gives a "Description of a New Species of *Telenomus* with Observations on its Habits and Life History," the species being named *Telenomus ashmeadi*. Frederic T. Lewis discusses "The Development of Pinnate Leaves" and D. P. Penhallow makes some "Contributions to [our knowledge of] the Pleistocene Flora of Canada," based on leaves from the interglacial deposits of the Don Valley,

Toronto. Finally, William E. Ritter gives the "Significant Results of a Decade's Study of the Tunicata." This is a most interesting paper, one of the kind that the student or "all around" naturalist appreciates, giving, as it does, in a concise form and clear language the results, and the bearing, of the observations made on this group of animals during the past ten years.

The Zoological Society Bulletin for July is an interesting number and records many important facts. First it notes the arrival of a pair of the Sudan African Elephants, *Elephas oxyotis*, the species with huge ears, and the one that attains the greatest size. The lamented Jumbo was a fine example of this species. "An Important Educational Collection" is contained in the Small Mammal House comprising examples of six orders of mammals to which it is hoped to add examples of three other orders (Pinnipedia will hardly rank as more than a Suborder). For teaching the rudiments of the classification of mammals this collection is most important, the more that it is well labeled, and the labeling at the Zoological Park is of the highest order, as instanced by the labels in the Reptile House. The ground in the north end of Baird Court has been laid out in a beautiful Italian garden and a new walk laid out through the fine beech woods by the beaver pond. Many species of birds living in the park have nested, including the rare Trumpeter Swan. Eighteen species of our warblers are now to be seen in the bird house, a most unusual number to be in captivity.

The Journal of Comparative Neurology and Psychology for July includes a paper by C. Judson Herrick on "The Tactile Centers in the Spinal Cord and Brain of the Sea Robin, *Prionotus carolinus*," giving data hitherto unpublished upon which the author relied in part in his analysis of tactile and gustatory connections in fishes. The "accessory lobes" of the spinal cord of the gurnards are adapted for short reflexes, chiefly confined to the segment involved and not affecting greatly distant parts of the central nervous system. The second paper is "An Experimental Study of

an unusual Type of Reaction in a Dog," by G. van T. Hamilton. The animal was trained in a complicated experiment box to determine the limits of complexity in association possible to the dog. James Rollin Slonaker reports on "The Normal Activity of the White Rat at Different Ages," recording by means of a kymograph record made by a revolving cage the total spontaneous activity of the rats from day to day.

DISCUSSION AND CORRESPONDENCE

STÖHR'S TEXT-BOOK OF HISTOLOGY

TO THE EDITOR OF SCIENCE: My edition of Stöhr's "Histology," reviewed in SCIENCE, July 26, has been the subject of some misunderstanding. The publishers of the previous American editions obtained Professor Stöhr's permission to make additions and changes in the book, provided that a preface disclaiming his responsibility for such changes should be inserted. Several text-books written on essentially the same plan were then available for American students, namely Huber's excellent version of Böhm and Davidoff; MacCallum's edition of Szymonowicz which presents fully certain American researches; Schäfer's brief but instructive Essentials; Ferguson's Histology illustrated by photomicrographs; Bailey's, and others, each with peculiar and desirable features. There was, however, no book which presented histology from a strictly embryological point of view, describing the development of an organ as an introduction to its adult structure. Since this treatment was considered both scientifically and pedagogically practicable, and since its use at the Harvard Medical School was hampered by the lack of a text-book, the editor accepted the offer of Messrs. P. Blakiston's Son & Company to rearrange Professor Stöhr's book upon this plan. The editor had no desire to work over again and to illustrate anew the familiar facts of histology, which were so well presented in several available books, notably in that of Professor Stöhr. The resulting volume has been used with gratifying success in the elementary course at the Harvard Medical School. There are de-

fects in illustrations and in statements (such as that which eliminates Paneth's cells from the duodenum), but the feature of this edition is its embryological treatment.

Professor Stöhr believes that histogenesis is too imperfectly known to be included in a text-book of histology, and that morphogenesis is there out of place. Such figures and embryological accounts as I have included he draws and presents in lectures on systematic anatomy. The reviewer in *SCIENCE*, however, believes that the idea of embryological arrangement is excellent, but that it has not been properly carried out. Thus he notes that the formation of the germ layers is not described in human embryos, although he does not state that human material is not yet available. If the chick and pig are referred to when similar human embryos have been described, it is because the student uses the former in the laboratory.

Another criticism is the failure to recognize American investigators, who are seldom referred to by name, and who, it is said, are "ignored" or "apparently unknown." Many of the papers cited, as those of Bardeen, MacCallum, Hendrickson, Calvert, Bensley, Opie, and Flint were re-read by the editor immediately before writing the corresponding sections of the book. It has been Professor Stöhr's practice to omit personal references, which he believes are out of place in an elementary histology. To do justice the book should teem with such references. The considerable number which I have introduced refer to very recent, or to important controverted work. A student should always have access to the memoirs, but whether or not they should be listed in an elementary text-book is questionable. Since the reviewer in *SCIENCE* believes that acknowledgment should always be made, it seems unjust to him that Professor Stöhr should have modified his diagrams of the spleen and lung after the appearance of Professor Mall's and Professor Miller's work, respectively, without recording his acknowledgments. I am informed that Professor Stöhr some time ago wrote to the publishers that he had examined Dr. Miller's

papers and used them as far as they seemed right to him, and that the diagram was mostly drawn according to Miller.

Some microscopic discoveries may be readily verified. Such was Professor Sabin's finding of the jugular lymph sac in mammals, so obvious a structure that I have a drawing of it made by a student some years before her paper explained its nature. In the text-book this sac is described but its discoverer is not recorded. Other findings, like those of the splenic lobules and units and of the atria of the lung may perhaps be verified after careful study by special methods. If neither the author nor the editor of the book is sure that he can identify the atria, he can not honestly describe them.

Professor Mall's researches on connective tissue which are thought by the reviewer to have received insufficient attention, are referred to on pages 39, 42 and 50 with accompanying figures. Altogether it is quite probable that German work is less fairly treated than American in this text-book, but the national element was not and should not be considered.

This edition of Stöhr's "Histology" was written to assist teachers in using the embryological method of presenting the subject. It is hoped that any teacher who is interested in such a method will examine the book.

FREDERIC T. LEWIS

CAMBRIDGE, MASS.,

July 27, 1907

SEISMOTECTONIC LINES AND LINEAMENTS—A
REJOINDER

IN the issue of *SCIENCE* for July 19, 1907 (pp. 90-93), Professor William M. Davis has reviewed my recent paper, "On Some Principles of Seismic Geology," published in Gerland's "Beiträge zur Geophysik" in March last (vol. 8, pp. 219-292). To his statement that "the seismotectonic lines seem, so far as earthquakes are concerned, to be largely influenced in location and direction by the evidently subjective element of the location of cities and villages in which observers are numerous," I would say, that some modifica-

tion of the results unquestionably arises from this cause, and this is true of all studies in seismic geography, as is fully set forth in my report. That it has not exercised a controlling influence upon the results, a careful reading of the report should show. Were this not the case, why should New York City, with its population of more than 3,000,000, be represented by nine epicenters, and East Haddam, Conn., by 145? why should Philadelphia have seven epicenters, and Newburyport, Mass., 84? Does it seem likely that in all southeastern New Jersey the little hamlet of Toms River should have been singled out for seismic prominence; in eastern Maryland, Accomac; and in the eastern Carolinas, Snow Hill?

When Professor Davis says: "Indeed, there is even less reason for thinking that seismotectonic lines should be closely related to centers of urban population than that rivers should run by large cities," he is attaching his handle at the wrong end. There is an excellent and most obvious reason why large cities should be located along the course of rivers, and there is an equally potent reason why seismotectonic lines should generally intersect large towns provided seismotectonic lines are expressed as lineaments. The seismotectonic line, like the lineament, and the proverbial horse, should come before the city and the cart, respectively. The relation of seismotectonic lines to cities has been discussed in my report on page 225.

doubtless be generally so interpreted by those not familiar with the paper under review. Stripped of some verbiage (baselevels, cycles of erosion, revived erosion, etc., with which the matter has little to do), the discussion might well have been taken from pages 254-255 of the paper reviewed, where I had supposed that the matter was presented in a somewhat new light. No possible objection can be raised to Professor Davis's borrowing of this idea and adopting it, but I should not like it to be supposed that the view is not also my own.

The subject of the straightness of fault lines and lineaments has been taken up in my report along the line of Professor Davis's discussion of it (pp. 285-286), as it has also in my earlier papers; and, I venture to think, in a more nearly adequate fashion. Better than any discussion of this subject is a presentation of evidence. Early in the present season I suggested to Mr. W. D. Johnson, of the United States Geological Survey, then as now in the Owen's Valley, California, the great desirability of securing photographs, and if possible maps, of the earthquake faults which were formed there in 1872. In response to this suggestion Mr. Johnson has, with painstaking labor, prepared detailed maps covering considerable areas of the faulted region, and these with an unusual generosity he has placed at my disposal for study. These maps will shortly be published and will make, I do not hesitate to say, one of the most important of



FIG. 1. Map of a zone of dislocation revealed at the surface after the earthquake in the Owens Valley, California, in 1872. Surveyed by Mr. W. D. Johnson, U. S. Geological Survey, in June, 1907. Scale, 240 feet equal one inch. The figures indicate throws, and the arrows the facings of the scarps.

The second portion of Professor Davis's review, which is headed "Fault Scarps and Fault-line Scarps," from the manner of its presentation would give the impression that it is in opposition to my own view, and it will

contributions to the science of seismology. The portion of one of these areas which is printed herewith, sets forth the complex nature of a zone of displacement; especially, however, its zigzagging course, its sudden

variations in displacement, its distribution of the throw over several near-lying and generally parallel planes, and, finally, the general persistence with which the zone of dislocation adheres to a definite course.

The object of this reply is to make clear that with the exception of the minor differences above referred to, the theses which Professor Davis has defended in his review, are just those which I have myself set up in the report reviewed, as well as in some other papers upon structural geology.

WM. H. HOBBS

UNIVERSITY OF MICHIGAN,
July 22, 1907

RAILWAY SIGNALS

TO THE EDITOR OF SCIENCE: By some inadvertence Dr. J. W. Baird, of the University of Illinois, in criticizing a recent article of mine on "Railway Signals," in the *Century Magazine*, has attributed to me the belief that the human retina at night is color-blind; and he wonders how, according to my doctrine, an engineer ever distinguishes his color signals at night. As a matter of fact, I distinctly state, in the very article he criticizes, that at night the eye is *not* color-blind: "Colors are readily seen at night if they are intense enough." The passage of mine which he quoted speaks explicitly of *faint* lights; for the signal-lights, bright enough in themselves, often become faint by distance, fog, smoke or storm. And of faint lights it is demonstrably true, as I said, and as every careful student of the subject knows, that the eye "no longer detects their proper colors."

2. As to the relative sensitiveness of the outlying portions of the retina for color and for form, it should be said that at a certain angular distance from the fovea a red danger-light can appear "white"—a common sign of safety. But in my own case I can easily distinguish correctly a horizontal from a vertical line, still farther off to the side. And even when, with greater angular distance, the direction becomes obscure, I find no tendency in a line-signal to appear to be its very opposite,

¹ "Railway Disasters at Night," *The Century Magazine*, May, 1907, p. 120, col. 2.

as in the case of certain color-signals. So far as the practical problem of signaling is concerned, therefore, it seems probable that indirect vision would be less likely to cause disastrous misperception of a line-signal than of color; and that Dr. Baird's contention here is not *stichhaltig*.

3. The fact that some illuminated semaphores have failed would hardly seem to justify the judgment that what I recommend is "antiquated" and a failure. As I shall attempt to show elsewhere, there is an essential difference between the long line of lights which I propose for signaling, and the devices that have failed.

4. Dr. Baird charges me with promulgating the "erroneous conception" that there are individuals weak in their color sense but by no means color-blind; and declares that "several thousand cases of 'color-weakness,'" examined by Nagel, of Berlin, turned out in every instance to be color-blind. This is certainly astonishing. For Nagel himself, in the very latest issues of his journal,² affirms that he has found many cases of markedly weak color-sense that were *not* color-blind at all. He finds the color-weak to be usually "anomalous trichromates"; but quite recently he has examined carefully a person who showed in a pronounced way the characteristic marks of color-weakness (*Farbenschwäche*), and yet was not even "anomal." Except for the color-weakness, his color-system was the normal "three-color" system. The "popular" and "erroneous" conception that there are color-weak persons who are not color-blind, seems thus destined to continue.

It is the more striking that these misrepres-

² *Zeitschrift für Sinnesphysiologie*, Vol. 41, pp. 250 f.; Vol. 42, pp. 65 ff. Could Dr. Baird's "several thousand cases of 'color-weakness,'" all proved by Nagel to be color-blind, have perhaps been drawn from the following passage in Nagel?—"Among many thousand persons whose color-sense I have investigated, I have found not a single instance of markedly weak color-sense that did not on closer examination turn out to be an anomalous trichromatic color-sense." (*Ibid.*, Vol. 41, p. 251). It is perhaps needless to add that "dichromatic" would have been used by Nagel had he meant (even partially) color-blind.

sentations, not of myself alone, but of Nagel and of the present state of color-investigation, should appear in a communication devoted to exposing the scientific mistakes of the popular magazines.

GEORGE M. STRATTON
THE JOHNS HOPKINS UNIVERSITY

SPECIAL ARTICLES

DIEMICTYLUS OR NOTOPHTHALMUS AS NAMES OF A SALAMANDER

THE very important work of Dr. Leonhard Stejneger on the "Herpetology of Japan and adjacent territory" has just been published, and among the many interesting points raised (and mostly satisfactorily settled) is one respecting a genus represented by very common American salamanders. The genus variously called *Diemictylus*, or *Notophthalmus*, being represented by a couple of Japanese species, is adopted with the first name. It is said, "Derivation and meaning obscure. Two derivations suggest themselves, namely, *διαμικτος*, from *διαμικνυμι*, or *δι-ήμικτοσ*, but the application of neither is obvious." The deduction is undoubtedly correct and my familiarity with names coined by Rafinesque and his methods in doing so enable me to give an explanation.

Rafinesque (1820), in his *Annals of Nature* (p. 5), claims that his *Triturus viridescens*, type of *Diemictylus*, has "the posterior [feet] with only three toes and two lateral knobs." The name evidently is intended to allude to this character and is badly condensed from *δεις*, twice, i. e., two, *ήμι-*, half, and *δακτυλος*, finger, the "two lateral knobs" being considered as half-toes. An analogous contraction is Rafinesque's *Decactylus*, curtailed from *δεκα*, ten, and *δακτυλος*, finger.

Dr. Stejneger has not given any reason for his preference of *Diemictylus* over *Notophthalmus*, but he may have some unknown to me. I have, however, always regarded *Notophthalmus* as the proper name. Rafinesque named both in the same article and on the same page (5), *Diemictylus* on line eight and *Notophthalmus* on line twenty-six. The characters assigned to both are worthless. It was

open to any later naturalist to adopt either name. S. F. Baird, in 1850, in the *Journal of the Academy of Natural Sciences of Philadelphia* (N. S., I., 281, 284), recognized that both *Diemictylus* and *Notophthalmus* were based on the same form and preferred the latter name. This, so far as I know, was the first use by an original investigator of either.

Edw. Hallowell, in 1858, in the same journal (N. S., III., 362), substituted *Diemyctylus* (changed from *Diemictylus*) for Baird's *Notophthalmus*. In this course, he was followed by Cope and other American zoologists. J. E. Gray, however, followed Baird in accepting *Notophthalmus*.

Cope (1859) preferred "*Diemyctylus*, though unmeaning, to the egregiously inappropriate *Notophthalmus* of the same date." On the contrary, I consider that *Notophthalmus* is very appropriate for the type species which is distinguished by the ocelliform dorsal spots, figuratively known as eyes, in accordance with many similar cases.¹ It is also well formed and euphonious. Perhaps Baird was influenced in accepting the name for these reasons as well as because the character connected with it ("toes of the fore feet free and unequal") was less inappropriate than that associated with *Diemictylus* ("fore feet semipalmate with four equal toes"). However this may be, *Notophthalmus* should be retained unless Dr. Stejneger knows of an earlier use of *Diemictylus*. We are both obedient to the same rule which provides for such cases, and which has guided him in the same work, a few pages farther on (p. 25) in accepting *Hynobius* rather than *Pseudosalamandra*. We have cause to be thankful for being freed from such a barbarous compound as *Diemictylus*.

Naturalists are to be congratulated because Dr. Stejneger has very satisfactorily accounted for the etymology of *Ambystoma* (p. 24). He has also accepted "the shorter form" for the names of families based on components ending in *stoma*, as "Ambystomidae for Amblystomatidae." I have always preferred this course.

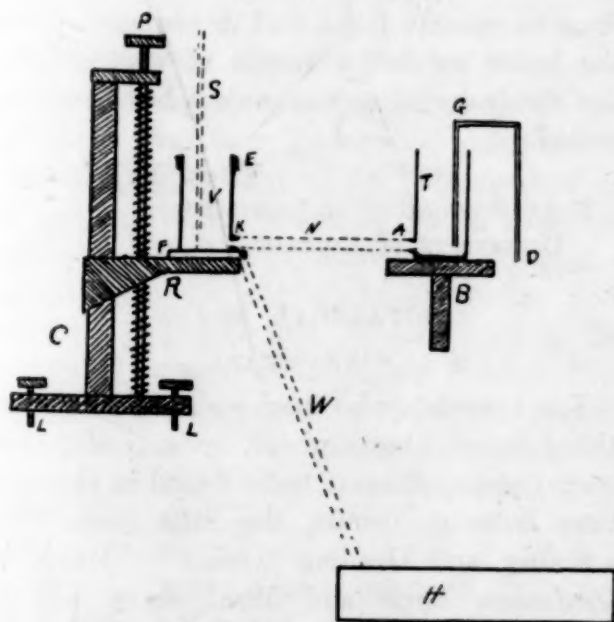
THEO. GILL

¹ E. g., eyes of the peacock's tail.

A NEW RHYTHM AND TIME DEVICE

AFTER having tried various rotation devices for the production of a series of uniform stimulations at regular intervals, I have concluded that the construction of such a machine which will be really reliable, is possible, but would be too expensive to be justified by present needs. Whether the machine could be designed so that gradations through all rates, from say one tenth second to two seconds, would be possible, is a question. Some of the machines which have been used for rhythm work have a fair adjustment for rate, but are irregular in speed, and depend on forms of electric contact which give exceedingly variable current strengths. A reliable and convenient mechanism as yet is not obtainable.

Feeling that rotation devices are out of the question for accurate work, I have turned my attention to the employment of the dropping of water, varying the rate of fall by changing the level of the water in the vessel from which



the drops issue. I have tried several arrangements of apparatus for the purpose, and have finally settled on one which is highly satisfactory. Reference to the figure will show the details of this, although not the proportions, as I have not had the parts drawn to any scale.

About four feet above the sink *H*, is a glass jar *T*, supported on a bracket *B*. From

the orifice *A* at the bottom of the jar, a rubber tube *N* runs to another jar *V*, supported by the stage *R* of the statif *C*, which stands on a high table beside the sink. A rubber tube *S* conducts a small stream of water from a faucet to the jar *V*, the tube dipping into the water in the jar to prevent disturbance of the surface. The overflow from *V* is caught by the saucer *F* in which *V* is set, and is conducted noiselessly to the sink by the rubber tube *W*. A band of cloth *E*, its edge flush with the edge of *V*, facilitates the overflowing, and keeps the water level constant. The siphon *GD*, of small bore tubing, slightly constricted in one place to retard the flow, and firmly held by a support not shown, drops the water upon a resonator or key placed in the sink. By turning the head *P* of the screw of the statif, the stage *R* and jar *V* may be raised or lowered, thus raising or lowering the water level in *T*, and accelerating or retarding the rate of the drops.

For auditory stimulation a tin resonator placed in the sink gives admirable results. For other purposes, where it is desired to utilize the making or breaking of an electric current, I have modified a light make-and-break key, by extending the lever and giving it a small disc to be struck by the falling drop. With this, I am able to operate telegraph sounders or telephone receivers for auditory stimulation, and sparks or Geissler tubes for visual, or to record on a kymograph drum.

Some care is needed in setting up and operating the apparatus. Air bubbles must be removed, although the double jar system reduces that trouble to a minimum. Shaking of the apparatus disturbs the drops, so accuracy will not be attained if the building is subject to much jarring. If the size of the drop is not sufficiently large, a ring of rubber tubing slipped over the end of the siphon *D*, will increase the adhering surface. The faucet should be adjusted so that a little water is constantly flowing down the side of *V*. The orifices *K* and *A*, and the tube *N* must be large enough so that the water level in *T* is quickly readjusted when the height of *V* is changed. The siphon *GD* may be of

about three thirty-seconds of an inch bore, "drawn" enough in one place to make the water level appreciably above *D* at slow rates of drop. A jar seven or eight inches high and three or four inches wide will be plenty large enough for *T*, and *V* need not be so tall.

I have made a number of record tests of the time accuracy of the drop, and find that it is perfectly reliable for one second to one eighth second, as shown by comparison with a 256-vibration fork. The drop will run much faster than one tenth second, if the size is properly controlled by the means mentioned above, but my key is too clumsy to record well much beyond one eighth. With a slight change in the key that difficulty will be obviated. From one second to six seconds my first records showed an apparent variation. These records for the longer periods were not intended to be extremely close, and were taken with a Zimmermann chronograph. I found later that the variation was in the chronograph, and have not yet tested these intervals with the tuning fork. Compared with a pendulum record, they appear perfectly regular. Intervals longer than six seconds I have not employed at all, although the apparatus is capable of furnishing them.

This device may be put to a variety of uses about a psychological laboratory. In addition to work in rhythm, I find it useful for time-records on the kymograph, for intermittent stimulation in work in fluctuation of attention, and for a time guide for an experimenter in the employment of definite intervals of preparation for a stimulus or between successive steps of an experiment. The key may be adjusted to give a regularity of current strength far greater than that of even mercury contacts of other time machines, making the apparatus especially valuable where this condition is of great importance, as in the rhythm and attention experiments.

KNIGHT DUNLAP

JOHNS HOPKINS UNIVERSITY

ON QUININE SULPHATE AND HUMAN BLOOD

QUININE sulphate when administered in small doses to healthy students has been found

generally to slightly increase the phagocytic action of the polymorphous mentrophiles but in some cases it slightly inhibits.

In vitro an inhibitory effect, together with some laking was found when the strength of the sulphate ranged from 1/1,000 to 1/15,000 while from 1/16,000 to 1/1,000,000 dilution there was increased phagocytosis in periods ranging from 30 to 60 minutes, being most marked at a strength of 1/75,000. There was noted in all suspensions, which contained more than 1/20,000 of quinine sulphate, a marked absence of the granules from the polymorphous neutrophiles. The cell membrane was often gone. Vacuoles were very frequently present. As contrasted with those in the unquinized specimens their cytoplasm showed diminished staining powers which was strong evidence of the destructive action favored by the quinine.

A simple method requiring only a few hours for its accomplishment has also been worked out for studying in vitro the effect of any drug on opsonic index and in connection with the latter subject a means of standardizing the virulency of any organism has been suggested.

THOS. M. WILSON

HULL PHYSIOLOGICAL LABORATORY,
UNIVERSITY OF CHICAGO

BOTANICAL NOTES

FARM BOTANY

For botanists who may wish to learn something more about wheat, oats, barley and corn (maize) than is to be found in the ordinary botanical works, the little book, "Examining and Grading Grains" (Ginn), by Professors Lyon and Montgomery will be found useful. Many a botanist will be surprised at the number of things which may be seen in a careful study of these common plants. For classes in applied botany in agricultural schools and colleges it must prove very helpful.

FOSSIL IOWA PLANTS

PROFESSOR MACBRIDE's paper on "Certain Fossil Plant Remains in the Iowa Herbar-

ium" is an interesting contribution which appeared recently in the *Proceedings* of the Davenport Academy of Sciences. It is accompanied with a dozen excellent plates. Several new species are described, namely, *Sigillaria calvini*, *Psaronius borealis*, and *Araucarioxylon occidentale*. Two modern species are recognized, viz.: *Picea mariana* from beneath the drift in Washington county, Iowa, and *P. canadensis* from the base of the blue clay in Keokuk county.

OUR FOREST RESERVES

UNDER the title of "The Use of the National Forests" the United States Forest Service has issued a booklet of forty-two pages, giving much information in regard to the National Forests (forest reserves), and intended to explain concisely what they are for, and how they should be used. A few well-selected half-tone reproductions of suggestive photographs add materially to what must prove to be a very useful publication.

HISTORY OF AMERICAN BOTANY

IN the June number of *The Popular Science Monthly* Professor Underwood publishes an entertaining account of the "Progress of our Knowledge of the Flora of North America," illustrated by half a dozen reproductions of plates from the old works of Porta, Bock, Cornut, Plukenet and Micheli, and a facsimile of a page of Linne's "Species Plantarum." The paper is well worth reading, especially by the younger botanists, who had no part in the work of the last half of the nineteenth century.

SOUTH DAKOTA CONIFERS

A BULLETIN of more than local interest is No. 102 of the South Dakota Experiment Station, devoted to "Evergreens for South Dakota." It was prepared by Professor Hansen, and brings together the results of many years of experience upon the prairies and plains of the northwest. While the treatment is necessarily quite popular, the bulletin contains much information which must prove useful to the botanist who is interested in the

relations of climate, soil and other physical factors to the distribution of species. No botanist can run over these pages without finding that some of his notions as to the distribution of the conifers must undergo material change. Twenty-six half-tone illustrations help the reader to a better understanding of the text.

SEEDS OF COMMON GRASSES

MUCH like the foregoing is bulletin No. 141 of the Kansas Experiment Station, in which Professor Roberts and Mr. Freeman discuss and illustrate the seeds of certain common grasses, and the common adulterants and substitutes. Here again the botanist who is interested in a critical knowledge of plants may obtain many hints as to the usefulness botanically of such work as this in our experiment stations, when done as carefully as this seems to have been. Few systematic botanists have that accurate and detailed knowledge of the "seeds" of grasses which was necessary in the preparation of this bulletin. It may indeed be considered a valuable contribution to the morphology of systematic botany, as well as a helpful bulletin for the practical farmer.

A TROPICAL SCHOOL OF BOTANY

PROFESSOR DOCTOR KELLERMAN, of the Ohio State University, Columbus, Ohio, has planned a tropical school of botany for next winter, which ought to attract the attention of some of our young men who are fitting themselves for their life work as teachers of botany. The session extends from December 19 to March 19, and will be held in Guatemala, Central America. The camps will be located at Zacapa (100 miles from the coast), Los Amates (40 miles inland), Izabal (on Lake Izabal), and perhaps also at Livingston (on the coast). Only a small number of young men will be accepted, and those who intend joining are advised to do so at the earliest day possible. The fee for the three months, including traveling expenses, board and lodging, is \$226.00. The project is one that should be of interest to botanists generally, as affording excellent opportunities for instruction along unusual botanical lines.

DR. MAXWELL T. MASTERS

THE July number of the *Journal of Botany* (London) contains a portrait and short account of the life of the late Dr. Maxwell T. Masters, the well-known English botanist, who died on the thirtieth of May last, at the age of seventy-four years. He wrote "Vegetable Teratology," a book that for nearly forty years has been the standard and practically the only work on the subject. He was also the editor of the *Gardeners' Chronicle*, perhaps the foremost horticultural journal in the world.

PROGRESSUS REI BOTANICAE

ANOTHER *Heft* (3) of Dr. Lotsy's "Progressus Rei Botanicae" (pub. by Fischer, Jena) has made its appearance. It carries the first volume from page 533 to its conclusion (p. 642), and contains but one article (by R. P. van Calcar) "Die Fortschritte der Immunitäts- und Spezifizitätslehre seit 1870."

NEW EDITION OF CAMPBELL'S BOTANY

AFTER five years the Macmillans bring out a second edition of Campbell's well-known "University Text-book of Botany." So well written was the first edition that it was not necessary to make many changes in the text; in fact the new book is so little different from the old that it may be used in the same class with no inconvenience. It is practically the best general text-book to-day for the American student of advanced botany.

EXPERIMENTS ON THE INFLUENCE OF LIGHT

IN the October *Annals of Botany* Professor Peirce records certain experiments made by him to determine the kind and amount of irritability of certain young plants in relation to light. Although his experiments were interrupted before completion (by the San Francisco earthquake) he shows that as the direction of illumination is usual or unusual certain plants have their normal form, or some other wholly different. "It is evident," he says, "that unless the young plants developing from the spore are exposed to influences like those under which their parents developed, they will be unlike their parents." A broader

statement of this conclusion is that "certain physical factors of the environment, constant or periodic but unchanging, constitute means of repeating parental characters generation after generation, and these environmental influences are as essential as the substance. Given the same chemical compounds and the same arrangement of these in the fertilized egg as in the parents, the young must be like the parents if their environment is the same." The paper is well worth careful reading, and it is to be hoped that Professor Peirce will be able soon to resume his abruptly interrupted experiments.

CHARLES E. BESSEY

THE UNIVERSITY OF NEBRASKA

CONCILIIUM BIBLIOGRAPHICUM

DR. HERBERT HAVILAND FIELD is visiting this country in connection with the Zoological Congress and the interests of the Concilium Bibliographicum of Zurich. Visitors to the Congress will find a set of the cards of this great zoological catalogue on exhibition in the Harvard Medical School. There is also a complete set arranged to date in the American Museum of Natural History. A duplicate set in the American Museum is available for immediate orders.

Dr. Field is seeking to organize the business affairs of the Concilium on a somewhat more permanent basis by the appointment of a director, on a salary to be fixed by American trustees, the director to administer the affairs of the Concilium without any pecuniary interest in its profits or losses, but solely with the interest of maintaining the high character of the bibliographical work which it has already accomplished. For this purpose and for the general expenses of the Concilium an annual sum of \$5,000 is needed either from an endowment fund of \$100,000 or from a special annual subscription fund.

It seems appropriate that a special effort should be made by American zoologists to raise such a fund in order to further the interests of the Concilium, which reflects such great credit upon this country as well as upon the Swiss government, which has so cordially

supported it. For the immediate purposes of the Concilium it is necessary to raise a special fund to cover the purchase of new type-setting machines and other apparatus which will greatly facilitate all operations. During the present summer Dr. Field may be reached by letters addressed in care of the American Museum of Natural History. A special American committee will be formed during the meeting of the International Zoological Congress to take this matter in charge.

HENRY FAIRFIELD OSBORN

THE BRITISH ASSOCIATION'S GRANTS FOR SCIENTIFIC RESEARCH

At the recent Leicester meeting of the British Association for the Advancement of Science, grants for research were made to the amount of nearly £1,300. The characters of the grants and the approximate amount in pounds is as follows:

Section A—Mathematical and Physical Science. Seismological observations, £40; further tabulation of Gessel functions, £15; kites committee, £25; geodetic arc in Africa, £200; meteorological observations on Ben Nevis, £25.

Section B—Chemistry. Wave-length tables of spectra, £10; study of hydro-aromatic substances, £30; dynamic isomerism, £40; transformation of aromatic nitramines, £30.

Section C—Geology. Fossiliferous drift deposits, £11; fauna and flora of British Trias, £10; crystalline rocks of Anglesey, £3; faunal succession in the carboniferous limestone in British Isles, £10; erratic blocks, £18; pre-devonian rocks, £10; exact significance of local terms, £10; paleozoic rocks, £15; composition of Charnwood rocks, £10.

Section D—Zoology. Index animalium, £75; table at the Zoological Station at Naples, £100; heredity experiments, £10; fauna of Lakes of Central Tasmania, £40.

Section E—Geography. Rainfall and lake and river discharge, £5; investigations in the Indian Ocean, £50; exploration in Spitsbergen, £30.

Section F—Economic Science and Statistics. Gold coinage in circulation in the United Kingdom, £6.

Section G—Engineering. Electrical standards, £50.

Section H—Anthropology. Glastonbury Lake Village, £30; excavations on Roman sites in Britain, £15; anthropometric investigations, £13; age of stone circles, £53; anthropological photographs, £3; anthropological notes and queries, £40.

Section I—Physiology. Metabolism of individual tissues, £40; the ductless glands, £30; effect of climate upon health and disease, £35; body metabolism in cancer, £30; electrical phenomena and metabolism of arum spadices, £10.

Section K—Botany. Structure of fossil plants, £15; marsh vegetation, £15; succession of plant remains, £45.

Section L—Educational Science. Studies suitable for elementary schools, £10.

Corresponding Societies Committee. For preparation of report, £25.

SCIENTIFIC NOTES AND NEWS

At the Meudon Experiment Station, which is affiliated with the Collège de France, M. Daniel Berthelot has been appointed director of the laboratory for plant physics, and M. Muntz, director of the laboratory for plant chemistry.

PROFESSOR FRANCIS E. LLOYD has been placed in charge of the department of investigation of the International Rubber Company, Jersey City, N. J. His headquarters are at present with the Central Mexican Division, and he should be addressed at the Hacienda de Cedros, Mazapil, Zacatecas, Mexico.

DR. L. W. STEPHENSON has been appointed assistant geologist on the U. S. Geological Survey, and will be engaged for the next two years in the investigation of the geology and water resources of Virginia and the Carolinas.

FRANK M. SURFACE, Ph.D. (Pennsylvania), has been appointed associate biologist at the Maine Agricultural Experiment Station at Orono, Maine.

DR. DAVID T. DAY, who for twenty-one years has had charge of the preparation of the U. S. Geological Survey's annual report on the min-

eral resources of the United States, has requested to be relieved of duty as chief of the division of mining and mineral resources, in order to devote his time to the preparation for the survey of an exhaustive report on the petroleum resources of the United States. The director has accepted Dr. Day's resignation and has designated Mr. Edward Wheeler Parker to succeed him as chief of the division of mining and mineral resources. Mr. Walde-mar Lindgren will be associated with Mr. Parker in the work of this division, and to him has been assigned the scientific supervision of those parts of the annual report on mineral resources that relate to the metal-liferous ores.

PRESIDENT JORDAN, of Stanford University, has just returned from a visit to Australia and New Zealand. The purpose of this visit was the giving of a course of lectures in the University of Sydney on "The American University, its Organization and Ideals." Lectures on the same subject were given later at the universities of Melbourne and Adelaide and at the colleges at Christchurch, Wellington, Auckland and Wanganui in New Zealand. An address was given on "Agassiz as a Teacher" in the University of Sydney on the centenary of the birth of Agassiz.

DR. TEMPEST ANDERSON, Professor A. R. Forsyth, F.R.S., Mr. D. G. Hogarth, Lieut.-Colonel Prain, F.R.S., and Professor C. S. Sherrington, F.R.S., have been elected members of the council of the British Association for the Advancement of Science.

THE meeting of the British Association for the Advancement of Science, which is to be held next year at Dublin, under the presidency of Mr. Francis Darwin, will open on September 2. It will be remembered that Sir George Darwin presided over the South African meeting of the association two years ago. The *London Times* states that the election of Mr. Francis Darwin is appropriate in view of the fact that the meeting next year will mark the fiftieth anniversary of the publication of "The Origin of Species." "The Origin of Species" was, however, published towards the close of the year 1859.

It is proposed to recognize in some suitable manner the scientific services of Professor J. G. McKendrick, F.R.S., who has lately retired from the chair of physiology at Glasgow.

DR. G. HABERLANDT, professor of botany at the University of Graz, has been elected a member of the Vienna Academy of Sciences.

DR. VLADIMIR V. PODVYSOCKIJ, director of the Imperial Institute for Experimental Medicine at St. Petersburg, has been appointed chairman of the committee appointed by the Russian government for the investigation of cancer.

It is reported in the daily papers that Dr. H. W. Wiley, while abroad, is making arrangements for an international conference to be held in this country to consider legislation on pure food and adulterations.

PROFESSOR WM. BULLOCK CLARK, of the Johns Hopkins University, who is spending the summer in Europe, will attend as a delegate and member the celebration of the founding of the Geological Society of London, and of the German Geological Society. Professor Harry Fielding Reid, of the Johns Hopkins University, will also be a delegate to the anniversary meeting of the Geological Society of London.

MR. H. C. PLUMMER, assistant in the Oxford University Observatory, has been appointed fellow at the University of California and will be stationed at the Lick Observatory.

DR. CHARLES K. SWARTZ, working under the auspices of the United States and Maryland Geological Surveys, will this summer complete a portion of work on the Paleozoic formations of western Maryland, being assisted by Dr. Ohern and Mr. T. Poole Maynard.

DR. M. W. TWITCHELL, professor of geology at the University of South Carolina, will be engaged during the summer in investigating the Coastal Plain deposits of South Carolina.

HARLAN I. SMITH is making a preliminary archeological reconnaissance of Wyoming for the American Museum of Natural History. This state is the center of an extensive field unknown archeologically. Mr. Smith is endeavoring to interest local scientific and educa-

tional institutions in the work, in which they must cooperate if the problems are to be solved.

DR. ELLIOT R. DOWNING, head of the biological department of the Northern State Normal School, Marquette, Michigan, has leave of absence for a year and will spend it largely at the biological laboratories of Europe. Miss Theodosia Hadley, assistant in the department, will take his place during his absence. Dr. Downing's address, until October first, is Woods Hole, Mass.

THE Romanes lecture will be delivered by Lord Curzon, chancellor of Oxford University, on November 2. The subject will be "Frontiers."

THE council of the British Association has recommended the republication of Sir William Hamilton's mathematical memoirs in an accessible form.

SIR JOHN JACKSON has established in the University of Edinburgh a fund for the encouragement of physical research in honor of the late Professor Tait. The fund will yield an annual income of about \$1,000.

WE learn from *Nature* that Mr. Charles Hawksley has commemorated the centenary of the birth of his late father by offering the sum of £1,000 to the council of the Institution of Mechanical Engineers for the foundation of a scholarship or premium. The offer has been accepted by the institution, and the terms on which the gift is to be held are under consideration.

DR. WILLIAM THOMSON, emeritus professor of ophthalmology in Jefferson Medical College, Philadelphia, well known for his work in ophthalmology and especially in color-blindness, has died at the age of seventy-four years.

M. AUGUSTE PONSOT, professor of physics at Lisle, known for his researches on photography and cryoscopy, has died at the age of forty-eight years.

DR. EMIL PETERSEN, professor of chemistry at Copenhagen, has died at the age of fifty-one years.

THE death is also announced of Dr. Schlagdenhofen, director of the pharmaceutical faculty at Nancy.

SECTION H—anthropology—of the British Association, having passed a resolution to the effect "That the council of the British Association be asked to impress upon His Majesty's government the desirability of appointing an inspector of ancient monuments, fully qualified to perform the duties of his office, with full powers under the act, and with instructions to report periodically on his work with a view to publication," the council appointed a committee consisting of Sir John Evans, K.C.B., Sir Edward Brabrook, Mr. Sidney Hartland, Sir Norman Lockyer, K.C.B., and Lord Balcarras, to report on the proposal; and the report of the committee, having been approved by the council, was sent with a covering letter to the prime minister on December 19, 1906. The president also attached his signature to a memorial upon the same subject drawn up by the council of the Society of Antiquaries. It is understood that, whilst no immediate action will be taken by the government, the matter is receiving consideration, with the object of placing all ancient monuments in the United Kingdom under adequate protection and more effective supervision.

ARRANGEMENTS for cooperation in the investigation of underground waters and of the stratigraphy of Florida have been completed between the U. S. Geological Survey and the newly organized Geological Survey of Florida. Mr. M. L. Fuller, of the national survey, will have charge of the stratigraphic investigations, which will form a part of the broader investigations of the Atlantic and Gulf Coastal Plains being conducted by the United States and the local State Surveys under the direction of Mr. Fuller. The underground water studies will be divided between the state and the national surveys.

UNIVERSITY AND EDUCATIONAL NEWS

Two research studentships in science of the value of £60 and £40, respectively, have been founded at University College, London, by an

anonymous donor; they will be awarded for the first time next session.

THE trustees of the college of the city of New York are said to look with favor on the suggestion that a night college be added to the present work of the institution, for the assistance of those young men and women who can not afford attendance at the regular college.

THE summer school of the University of Nebraska closed on July 26, after a six weeks' session. An increasing number of regular university students entered the classes, and the instruction consisted very largely of courses which are identical with those which are given during the college year. Students are showing an increasing tendency to remain for these summer courses in order to shorten the time for attaining their degrees. By working three summer sessions the student may gain a semester's university credit, thus allowing him to graduate in three, or three and a half years, instead of four.

THE students in the ten Russian universities were last year distributed as follows: Dorpat (founded in 1632), 1,908; Helsingfors, in Finland (founded in the same year), 2,640; Moscow (founded in 1755), 5,489; Kharkoff (founded in 1804), 1,380; Kasan (founded in the same year), 1,255; Kieff (1832), 3,000; St. Petersburg (1819), 4,508; Odessa (1865), 2,066; Warsaw in Poland (1869), 1,400; Tomsk, in Siberia (1888), 786.

THE appointment is announced of Professor Charles Henry Benjamin to be dean of the Schools of Engineering of Purdue University, to succeed Dean W. F. M. Goss, who resigns in order to accept a similar appointment at the University of Illinois. Professor Benjamin comes to Purdue from the chair of mechanical engineering at Case School of Applied Science, which he has occupied since 1889, prior to which time he was, for three years, engaged in engineering practise and, for six years, as instructor and professor of mechanical engineering in the University of Maine, of which institution he is a graduate.

AT New Hampshire College, Mr. Charles James, F.I.C., has been promoted to an as-

sistant professorship of inorganic chemistry and Dr. D. L. Randall, Ph.D. (Yale, '07), has been elected instructor in the same department.

PROFESSOR CHARLES PURYEAR, head of the department of mathematics of the Texas College of Agriculture and Mechanic Arts, has been made dean of the college.

DR. JOHN WEINZIRL, who for the past ten years has been director of the Hadley Climatological Laboratory and professor of bacteriology in the University of New Mexico, has resigned to accept a professorship in bacteriology in the University of Washington at Seattle. His place in the University of New Mexico is filled by Jos. R. Watson, a graduate of Western Reserve University.

DR. R. C. ARCHIBALD, lately professor at the Mount Allison Ladies' College, Sackville, N. B., has been appointed professor of mathematics at Acadia University, Wolfville, N. S.

IT is announced that Dr. Howard Marsh, professor of surgery at Cambridge, will be elected master of Downing College to succeed Dr. Alex. Hill, who has retired.

AT Sheffield, Mr. D. R. de Souza has been appointed demonstrator in physiology, and Mr. W. F. G. Swann assistant lecturer and demonstrator in physics.

MR. MARTIN WHITE, who has for some years endowed the teaching of sociology in the University of London, has now founded two professorships in that subject, one permanently and the other for a period of five years. The appointment to the permanent chair has not yet been made; the other has been offered to and accepted by Dr. E. A. Westermarck, who has already held a lectureship in the subject at the university. Dr. A. C. Haddon has also been appointed university lecturer in ethnology for the session 1907-8 under the Martin White benefaction.

MR. AUGUSTINE HENRY, of the Royal University, Ireland, has been appointed reader in forestry in Cambridge University.